DOCUMENT RESUME

ED 310 923 SE 050 861

AUTHOR Stoloff, David L.
TITLE Limited English Proficient Students and Mathematics and Science Achievement: Strategies for Success Practiced within California Academic Partnership Program Projects.
PUB DATE 16 Feb 89
NOTE 21p.; Paper presented at the Meeting of the California Association for Bilingual Education (Anaheim, CA, February 16, 1989).
PUB TYPE Reports - Descriptive (141) -- Speeches/Conference Papers (150)

EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS *Limited English Speaking; Mathematical Enrichment; Mathematics Education; *Mathematics Instruction; Science Education; *Science Instruction; *Science Programs; Secondary Education; *Secondary School Mathematics; *Secondary School Science
IDENTIFIERS *California Academic Partnership Program

ABSTRACT

Mathematics and science instruction in schools often poses a challenge for limited-English-proficient (LEP) students. This paper discusses how the various curriculum development and assessment projects sponsored by the California Academic Partnership Program (CAPP) implement techniques for learning and teaching mathematics and science for LEP students. The historical development of the CAPP during 1983-1989 is summarized. Three strategies used by the CAPP are described: (1) tutoring and counseling; (2) parental and community involvement; and (3) team-teaching and curriculum development. The importance of further CAPP projects is discussed. Three references are listed. (YP)

****
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
****

ED310923

LIMITED ENGLISH PROFICIENT STUDENTS AND MATHEMATICS AND SCIENCE ACHIEVEMENT: STRATEGIES FOR SUCCESS PRACTICED WITHIN CALIFORNIA ACADEMIC PARTNERSHIP PROGRAM PROJECTS

a paper presented at the

California Association for Bilingual Education meeting

on February 16, 1989 in Anaheim, CA

Dr. David L. Stoloff,

Associate Professor,
Division of Ed'l. Foundations and Interdivisional Studies,
School of Education, California State University,
Los Angeles

and Project Director,
Academic Partnership in Science Education,
a California Academic Partnership Program project

U.S. DEPARTMENT OF EDUCATION
Office of Educational Research and Improvement
EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)

X This document has been reproduced as received from the person or organization originating it.

☐ Minor changes have been made to improve reproduction quality.

• Points of view or opinions stated in this document do not necessarily represent official OERI position or policy.

"PERMISSION TO REPRODUCE THIS MATERIAL HAS BEEN GRANTED BY

David L. Stoloff

TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)."

BEST COPY AVAILABLE

SE 050 861

LIMITED ENGLISH PROFICIENT STUDENTS AND MATHEMATICS AND SCIENCE ACHIEVEMENT: STRATEGIES FOR SUCCESS PRACTICED WITHIN CALIFORNIA ACADEMIC PARTNERSHIP PROGRAM PROJECTS

Mathematics and science instruction in schools in California often poses a dual challenge for limited English proficient (LEP) students. The symbols and syntax used in mathematics and science form non-native languages for all students. Additionally, the standard math and science textbooks and methods of assessment are usually written in a form of English that must be taught to most learners. Added to these challenges, for both the learners and their teachers, are those posed by the administrative structure of schooling, the degree of cultural understanding and diversity within the classroom, and shifting societal attitudes towards technology and language acquisition.

Success in mathematics and science represents for all students two of the major hurdles for pre-collegiate promotion and advancement into postsecondary education. Many universities and colleges require at least two to three years of "college-bound" mathematics and science for admission. Mathematics and science also are often very resistant to pressures for heterogeneous grouping of students in core curriculum classrooms. Intricate patterns of sequential instruction are most evident in math and science courses. According to conventional wisdom, certain

skills in recall and numeration are required before advancement into abstract thought. Therefore, LEP students, who are delayed in this sequence by the task of learning symbolic languages in math and science, through a non-native language, may never catch up to their English-speaking classmates. This difficulty in "staying with the grade level" may doom the limited English speaker to lowered self-esteem and shut the door to the usual college track.

This paper overviews how the various local curriculum development and assessment projects sponsored by the state-wide California Academic Partnership Program (CAPP) implement techniques for learning and teaching mathematics and science for limited English proficient students. Mathematics and science are viewed as a way of seeing, being, and knowing -- as both an abstract and practical study in the measurement and interrelationships of the environment. How limited English proficient learners are acculturated into this "mathematics and science lands" by the CAPP projects represents the focus of this essay.

An Overview of the CAPP Projects 1983 -1989

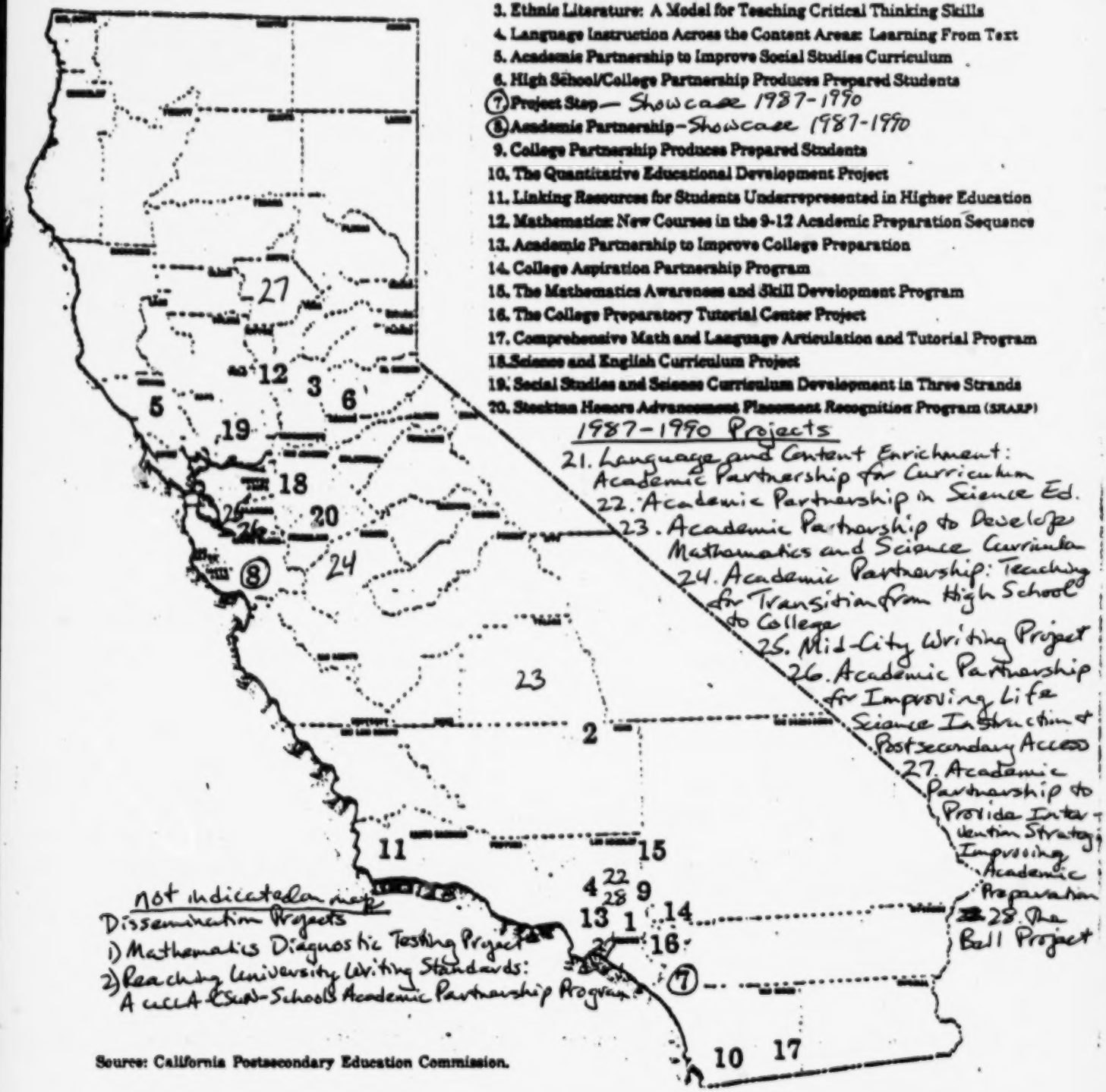
The California Academic Partnership Program arose as one of the manifestations of the school reform movement of the early 1980s. In 1983 and 1984 through California Senate Bill 813 and Assembly Bill 2398, legislators, notably Assemblyperson Theresa Hughes and State Senator Gary Hart,

supported educational programs designed to "develop cooperative efforts to improve the academic quality of the public secondary schools with the objective of improving the preparation of all students for college" (CPEC, 1988). The latter part of this goal placed emphasis especially on those students from groups currently underrepresented in postsecondary education (Galligani, 1987).

By the Fall of 1988, CAPP had funded state-wide 30 cooperative projects in curriculum development between secondary school district and postsecondary institutions. Twenty curriculum projects were funded for a three year period from January 1985 to July 1987. Two of these original projects received funding for the second three-year cycle of funding to serve as Showcase Projects, exemplary models for projects both state-wide and nationally. Additionally, CAPP funded the Mathematics Diagnostic Testing Project and the UCLA-CSU-Northridge Writing Project, two assessment projects, beyond these initial three years (ETI, 1988). In July 1987, seven new partnerships were funded; in July 1988, an eighth project joined this second cohort. The adjacent map illustrates the location and scope of the CAPP projects for the first two three-year funding cycles.

Of the 28 curriculum development projects, 18 conducted curriculum development activities in mathematics, 15 in science, 7 in social science, and 18 in language arts/English. Strategies for enhancing the academic

DISPLAY 2 Geographical Distribution of CAPP's Twenty Curriculum Development Projects


1984–1987 Projects
1. Five Star Academic Partnership
2. A Junior MESA Program for Rural and Metropolitan Students
3. Ethnic Literature: A Model for Teaching Critical Thinking Skills
4. Language Instruction Across the Content Areas: Learning From Text
5. Academic Partnership to Improve Social Studies Curriculum
6. High School/College Partnership Produces Prepared Students
7. Project Step — Showcase 1987-1990
8. Academic Partnership – Showcase 1987-1990
9. College Partnership Produces Prepared Students
10. The Quantitative Educational Development Project
11. Linking Resources for Students Underrepresented in Higher Education
12. Mathematics: New Courses in the 9-12 Academic Preparation Sequence
13. Academic Partnership to Improve College Preparation
14. College Aspiration Partnership Program
15. The Mathematics Awareness and Skill Development Program
16. The College Preparatory Tutorial Center Project
17. Comprehensive Math and Language Articulation and Tutorial Program
18. Science and English Curriculum Project
19. Social Studies and Science Curriculum Development in Three Strands
20. Stockton Honors Advancement Placement Recognition Program (SHARP)
1987-1990 Projects
21. Language and Content Enrichment: Academic Partnership for Curriculum
22. Academic Partnership in Science Ed.
23. Academic Partnership to Develop Mathematics and Science Curricula
24. Academic Partnership: Teaching for Transition from High School to College
25. Mid-City Writing Project
26. Academic Partnership for Improving Life Science Instruction & Postsecondary Access
27. Academic Partnership to Provide Intervention Strategy Improving Academic Preparation
28. The Ball Project
not indicated on map
Dissemination Projects
1) Mathematics Diagnostic Testing Project
2) Reaching University Writing Standards: A UCLA-CSUN-Schools Academic Partnership Program

Source: California Postsecondary Education Commission.

achievement of limited English-proficient students in the math and science curriculum development projects will be discussed in the following pages.

CAPP Strategies for Math and Science Achievement

The California Academic Partnership Program projects employ at least a dozen strategies for reaching their goals of greater student achievement and increased postsecondary enrollment of students from underrepresented groups. Of these strategies, 1) tutoring and counseling, 2) parental and community involvement, and 3) team teaching and curriculum development will be examined in this essay for their impact on limited English-proficient (LEP) students.

Tutoring and Counseling. Many LEP students are placed in math and science classes where instruction is English-only. In these classes, it is crucial that the LEP student have some source of cultural reference. Peer tutors or undergraduate role models for LEP students have play such essential roles in several projects. The author directs one of these projects, the "Academic Partnership in Science Education", a Partnership between the Pasadena Unified School District, the California State University, Los Angeles, Pasadena City College, and the University of Southern California. Engineering, science, and math undergraduate students, who were initially LEP students when they first arrived in southern California, provide in-class coaching to more recently arrived LEP students in math.

Several of these undergraduates have expressed interest in becoming teachers, or at least a renewed respect for the profession, from their experiences with these students. The connections between the successful undergraduate and the recently arrived LEP students often become very strong. The undergraduates practice strategies of one-on-one teaching, techniques that helped them succeed in math, and become active in problem-solving other areas of the students' academic progress and social adjustment within the school. These undergraduates have served as bilingual bridges for LEP students for they can relate in a non-threatening manner how they progressed to fluency in a new language and succeeded through the school system.

This Partnership in Pasadena also enlists graduate counseling education students doing their internship with School Counselors in the Pasadena USD high schools. These counseling interns have individual interviews with the students each semester in the targeted math and science courses to discuss college admission and study-skills, monitor attendance, and maintain open-doors for student support.

A Kern and Tulare Counties partnership project, "A Junior MESA Program for Rural and Metropolitan Students", also employed tutors from colleges and high schools. Emphasis was placed on direct tutorial assistance including motivational counseling, study-skills development, and

enrichment support. This Partnership in the Bakersfield area also relied on peer tutoring, independent study groups, small group instruction, and cooperative learning as important techniques to enhance instruction for LEP. LEP students from the same language group working together shared insights and vocabulary and were synergistically more effective at the learning task. LEP students "ganging up" for math and science learning incorporated all the positive elements of social bonding found among adolescents. By meeting regularly with the teacher and the undergraduate teaching assistant leaders outside of the class, learning math for the students became associated with friendships and fun.

Tutors in the "College Aspiration Partnership Program", centered in the ABC Unified School District, served to create CAPP clubs with bonding exercises, student services, and conference guidance. One of the Partnership's goals was to instill in the students a sense of being part of an elect group which others might want to emulate or join. In "The Quantitative Educational Development Project", in three junior high schools in San Diego, college students provided tutorial and skill-development assistance. Stress was placed on both the LEP students' intellectual and emotional developmemt.

In the "Mathematics Awareness and Skill Development Program", centered in the Whittier USD, tutors assisted high

school teachers in class, tutored after school, and maintained a tutorial lab open one night per week. In the "College Preparatory Tutorial Center Project" centered around the Centinela Valley USD, tutors from both a local community college and the high school project site provided additional tutorial assistance to project student participants who were involved in computer-assisted instruction in mathematics and English before and after school.

The "Gateways through Academic Partnerships", concentrated at Watsonville High School, makes use of cross-age tutoring and counselor training to support LEP students. Successful students in high school participate in introductory sessions for entering freshpeople and serve in the articulation processes with junior high students. This project also developed a Learning Assistance Program, designed by tutors and faculty at the high school and university, for students enrolled in advanced mathematics and physical science courses The goal of the "Comprehensive Math and Language Articulation and Tutorial Center Program" in the Sweetwater Unified High School District was to "establish a district-wide peer tutoring system using revised mathematics-related curricula". In these two projects, cross-age tutoring and the development of student social networks for learning were stressed.

The tutoring and counseling of LEP students by their peers, older students, college role models, teachers, and school counselors were strategies used by many of the CAPP projects. Social, as well as academic, development were recognized as essential elements of success in math and science for all students. All of the CAPP projects additionally recognized that strategies to increase parental and community involvement in the tutoring and counseling process were crucial for student success.

Parental and Community Involvement Mathematics education for LEP students must also call on the support of individuals and groups outside of the schools. Parental involvement in the schools is currently viewed as one of the most obvious indicators of program success. In "Project STEP", one of the California Academic Partnership Program showcase projects centered around the Santa Ana USD (Orange County, CA), parental attitudes towards student achievement in math have greatly improved through a family math program. This family math program makes use of frequent newsletters and evening meetings and events to encourage a more positive attitude towards studying math by both students and teachers and a greater understanding of the importance and relevance of math in daily life and in future careers. The "Gateways Through Academic Partnership", a California Academic Partnership Program (CAPP) project sponsored by the Pajaro Valley USD and the University of California, Santa Cruz,

uses home visits by university and school faculty and the participation of parents in a Summer Science and Mathematics Academy at UCSC as two strategies employed to support academic success in mathematics and science by LEP students.

Other community resources may be used to promote math and science success for LEP students. Several CAPP projects, such as the "Academic Partnership for Improving Life Science Instruction and Postsecondary Access", centered around the Oakland (CA) Health Academy, encourage school and university faculty and community health experts to team teach in each other's settings. The "Academic Partnership to Provide Intervention Strategies Improving Academic Preparation", centered around the Oroville USD (CA) and CSU, Chico, and other CAPP projects, organize field trip for students to local universities and businesses, such as Hewlett Packard, a major electronics corporation, to underscore the relationships between math and future career possibilities.

Representatives from local businesses, local cultural groups, and returned Peace Corps volunteer organizations might be invited into the math classroom to discuss how math is used in daily life both in the USA and in the countries of origin of the LEP students. Insurance agents and bankers have visited classrooms in the "Academic Partnership in Science Education", centered in the Pasadena USD, to explain the importance of math for many careers and for the

students' future. Northup Corporation, one of the partners in the "College Preparatory Tutorial Center Project" in the Centinela Valley USD, provided students that reached the twelfth grade and had mastered basic skill objectives with an internship program.

Tutoring and counseling programs serve as supplements to the regular functioning of a school. Parental and community involvement also support the general organization of the educational enterprise. A third strategy employed by several CAPP projects, team teaching and curriculum development, may represent the major innovative thrust of the CAPP program.

Team Teaching and Curriculum Development Mathematics, science, and limited English proficiency students have an important commonality -- they all use languages that may not be the most valued in a school. Several paradoxes occur about the teaching of mathematics and science in USA schools. Math is often considered to be the language of the sciences. Reoccurring patterns in the sciences, music, the arts have clear reference in mathematics. The practical arts taught in vocational classes in schools rely heavily on basic math skills. Math forms a foundation for many of the classes in a school, yet there is most often an inability to integrate math concepts effectively in other classes. Teachers are often isolated in their classrooms and don't have the oppportunity to plan for team teaching,

sharing curricular ideas, and organizing individualized educational plans for most students.

Many attempts have been made to integrate mathematics and with other content areas. The key ingredient in this successful merging of abstract concepts in math with "real-life" applications in science or vocational education is the amount of time that the teachers have together to plan their collaborations. Forming partnerships among teachers is only the first step in creating more effective learning environments for LEP students. The school administration needs to support this school-wide approach to math and science language learning with staff development time and with techniques for increasing faculty communication. In the "Academic Partnership to Develop Mathematics and Science Curricula", a CAPP project in the eastern Sierras (Bishop, Delano, Porterville School Districts, Porterville College, and California State University, Bakersfield), communication between mathematics and science teachers within and between three school districts is strengthened for the goal of increasing the number of LEP students chosing math or science as a college major. Participating teachers have prepared a "problems manual", a resource to integrate mathematics strands with science concepts and processes, send positive proficiency notices to parents, and have formed a math and science club to encourage student-parent involvement.

At Alhambra (CA) High School, not a CAPP school but a worthy example of a school with a high percentage of limited English proficiency students and one of the most successful math/science programs in California, math and science teachers are "networked" through their in-class computers. This computer network allows these professional educators to share curricular ideas, suggest where their lessons might overlap, and rapidly communicate any tips on the dispositions of their students. Sharing information about student progress, particularly LEP students, and maintaining "vital", in this word's sense of "lively", records would add to the possibility of achieving the goal of individualizing all students' education.

Several projects sought to create intersegmental and community teams to reach their goals of a "fully articulated curriculum". In the "Comprehensive Math and Language Articulation and Tutorial Center Program" centered around the Sweetwater Unified High School District, workshops were presented to staff, parents, and students to disseminate a revised mathematics-related curricula, prepared collaboratively by secondary and postsecondary faculty, that stressed language use. The "College Aspriation Partnership Program", centered around the ABC Unified School District, created teams of teacher-advisors and an "Articulation Faculty", composed of faculty from senior highs and their feeder junior highs and from subject matter departments at

the university to revise curriculum, increase intersegmental articulation, and implement peer counseling and tutoring programs. The "Mathematics: New Courses in the 9-12 Academic Preparation Sequence", centered in the San Juan, Grant Joint, Elk Grove, and Sacramento USDs, developed two new math courses through summer conferences, bi-monthly resource meetings, and one- and two-week summer sessions of partners from these schools districts and the local UC and CSU campuses.

Several of the CAPP projects developed summer programs to provide students with a "head start" into high school and college-bound courses. The "Linking Resources for Students Underrepresented in Higher Education" project, concentrated around Santa Barbara High School District, created a summer school program with enrichment activities, such as word processing and preparation for college admissions testing. The "Gateways Through Academic Partnership" in Watsonville sponsored a "Summer Science and Mathematics Academy for promising ninth and tenth graders on the UC, Santa Cruz campus with faculty with the university and high schools serving as teacher-mentors. The "High School/College Partnership Produces Prepared Students", centered in Sacramento, developed a summer Early Start Program for middle school students to "increase their knowledge about and preparedness for college, using aptitude and placement

testing, and intensive academic counseling for students and their parents".

Towards the Future of Success in Math and Science for LEP Students within CAPP Projects

The California Academic Partnership Program is currently seeking intersegmental groups who would wish to develop a planning proposal for their own strategies for success in math and science for LEP students. Figure 1 and 2 detail an announcement for a state-wide conference on February 23. Another participation sites have been added to the list in Figure 2.

Within the past and current CAPP projects, limited English proficient students have been looked upon as a resource for math and science teachers. As "new-comers" to the USA educational system, these students have provided the teacher and other students additional perspectives in learning math. As students who are in the process of learning a new language, LEP students develop their own special strategies for studying and making sense out of the school environment. Other students learn more about other cultures and ways of processing information; small group projects are enriched by their presence. LEP students also offer teachers special challenges in the careful assessment of student skills, the sequencing of instruction, and the importance of repetition in any learning task. LEP

Figure 1

The California Academic Partnership Program *presents*

Planning Your Partnership

a statewide teleconference for California educators
and others interested in academically based school-college collaborations

LIVE BY SATELLITE

THURSDAY, FEBRUARY 23, 1989
2:00 p.m. – 4:00 p.m.

A two-hour telecommunications event to

- invite proposals for planning grants by academic partnerships between California school districts, colleges and universities to provide students in grades 6-12, especially those underrepresented in higher education, with the academic skills necessary for successful completion of the baccalaureate degree;
- present up-to-the-minute information about the California Academic Partnership Program (CAPP), its Call for Planning Grant Proposals, and its current projects; and
- answer your questions about CAPP, its planning grants, and its experience with academic partnerships.

All California educators and others interested in academic partnerships are cordially invited to participate in this teleconference, presented by the California Academic Partnership Program in cooperation with University Media Services, California State University, Sacramento.

There are no fees or charges for participation.

For more information, please call 213-590-5379.

Figure 2

Registration and Teleconference Sites

You can participate in the **Planning Your Partnership** teleconference at any of the several schools, school districts, county offices of education, colleges and universities throughout California that are serving as teleconference reception sites.

The following is a preliminary list of reception sites. If this list does not include a site that is convenient for you to attend, ask your school district, county office of education, or college or university if it has agreed to serve as a reception site, or would be willing and able to do so. Additional reception sites will be welcomed.

To reserve a place at a reception site, and a copy of the **Planning Your Partnership** teleconference information packet, you must register by telephoning the contact person for one of the reception sites by February 14, 1989.

Additional sites must register by February 14, 1989. Contact Teleconference Coordinator Thomas Karwin, P. O. Box 7600, Santa Cruz, CA 95061. Telephone (408) 426-5981.

Alameda County

California State University, Hayward
Instructional Media Center, Library 2196
Hayward, CA 94542
Contact: Roger Purbo, (415) 881-3492

El Dorado County

South Tahoe High School (Lake Tahoe Unified)
1021 Lake Tahoe Boulevard
South Lake Tahoe, CA 95072
Contact: Bill Murray, (916) 587-3580

Fresno County

West Hills Community College
300 Cherry Lane
Coalinga, CA 93210
Contact: Pamela Hawkins, (209) 935-0801, Ext. 206

Glenn County

County Office of Education
Hamilton Union High School
Hamilton, CA 95902
Contact: Peter Whitehouse, (916) 934-7011

Humboldt County

Holtville High School (Holtville Unified)
735 Olive Avenue
Holtville, CA 92250
Contact: Jack Tweedy, (619) 356-2974

Imperial County

Imperial County Office of Education
1398 Sperber Road
El Centro, CA 92243
Contact: Larry Groves, (619) 339-6403

Kings County

Lemoore High (Lemoore Union High)
101 Vine Street
Lemoore, CA 93254
Contact: Bill Hook, (209) 924-6636

Lassen County

Herlong High (Big Valley Joint Unified)
D. Hall and Tahoe Streets
Herlong, CA 96113
Contact: Susie McKelley, (916) 827-2102

Los Angeles County

College of the Canyons
26455 North Rockwell Canyon
Valencia, CA 91355
Contact: Jan Keller, (805) 259-7800, Ext. 330

Madera County

Madera County Office of Education
28123 Avenue 14
Madera, CA 93638
Contact: Cecilia Maxwell, (209) 673-6051, Ext. 264

Mendocino County

County Office of Education
Conference Room
2240 Riverside Road
Ukiah, CA 95482
Contact: Cindy Thompson, (707) 468-4884

Merced County

Merced County Office of Education
632 West 13th Street
Merced, CA 95340
Contact: Gordon Stallings, (209) 385-6361

Del Paso Joint Union High
1701 East Blossom Street
Del Paso, CA 95429
Contact: Pepe Johnson, (209) 393-2131, Ext. 23

Modoc County

Modoc County Office of Education
139 West Henderson
Alturas, CA 96101
Contact: Barbara Sidwell, (916) 233-3939, Ext. 423

Tehichi Basin Joint
Main Street
Tehichi, CA 96134
Contact: Charles Bimbrup, (916) 667-2295

Monterey County

Pacific Elementary
Star Route
Big Sur 93920
Contact: Bill Raabe, (805) 927-4507

Orange County

California State University, Fullerton
Office of Extended Education
Building T-14
Fullerton, CA 92634
Contact: Lee Bentley, (714) 773-2958

San Bernardino County

California State University, San Bernardino
5500 University Parkway
San Bernardino, CA 92407
Contact: Robert Senese, (714) 887-7294

San Diego County

San Diego State University
Campus Lab 114C
5305 Campanile Drive
San Diego, CA 92182
Contact: Sandi Stamm, (619) 594-6705

KPBS
Budson S. Plant Space Theater, Balboa Park
1875 El Prado, at Park Boulevard
San Diego, CA 92101
Contact: Sandi Stamm, (619) 594-6705

Southwestern College, Learning Resources Center
900 Otay Lakes Road
Chula Vista, CA 92010
Contact: Bill Alexander, (619) 421-6700, Ext. 7294

San Joaquin County

Stockton Unified
1144 East Channel Street
Stockton, CA 95205
Contact: Margaret Williams, (209) 944-4301

San Joaquin County Office of Education
Gaylord A. Nelson Education Center
2901 Arch-Airport Road
Stockton, CA 95206
Contact: Marsha Dean, (209) 468-4880

Santa Barbara County

Allan Hancock College
Learning Resources Center, Video Room
800 South College Drive
Santa Maria, CA 93454
Contact: Harold Bolen, (805) 922-6966, Ext. 475

Santa Barbara County Office of Education
4400 Cathedral Oaks Road
Santa Barbara, CA 93110
Contact: Wendy Stokes, (805) 964-4711

Santa Clara County

Santa Clara County Office of Education
Educational Media Center
55 Skyport Drive
San Jose, CA 95115
Contact: Nancy Rasmussen, (408) 947-6812

South County ROP
340 Swanston Lane
Gilroy, CA 95020
Contact: Maureen Robinson, (408) 842-0361

Santa Cruz County

Santa Cruz County Office of Education
809 Bay Avenue, Suite H
Capitola, CA 95010
Contact: Maureen Provost, (408) 476-7140, Ext. 324

Shasta County

Anderson Union High
1471 Ferry Street
Anderson, CA 96007
Contact: Harold B. Eady, (916) 365-2741, Ext. 308

Siskiyou County

College of the Siskiyous
Learning Resources Center, Room 3
Weed, CA 96094
Contact: Dennis Freeman, (916) 938-4461, Ext. 211

Siskiyou County Office of Education
609 South Gold Street
Yreka, CA 96097
Contact: Jim Hardy, (916) 842-5751

Solano County

Solano Community College
Administration Building 600, Board Room
4000 Suisun Valley Road
Suisun, CA 94585
Contact: Gwen Morris, (707) 864-7000, Ext. 250

Sonoma County

Cass Grande Senior High (Petaluma Joint Union High)
333 Cass Grande Road
Petaluma, CA 94952
Contact: Jerry Pressley, (707) 778-4707, -4677

Sonoma County Office of Education
Windsor Educational Center
9047 Old Redwood Highway
Windsor, CA 95492
Contact: Ken Groth, (707) 527-2171

Sutter County

Barnes Elementary
1268 Pacific Avenue
Rio Oso, CA 95674
Contact: Mary Johnson, (916) 633-2523

Trinity County

Trinity County Office of Education
201 Memorial Drive
Weaverville, CA 96093
Contact: Wayne Moss, (916) 623-5507

Ventura County

Ventura County Office of Education
Educational Services Center
570 Airport Way
Camarillo, CA 93010
Contact: Lee Selinski, (805) 388-4321

At Cal. State, LA — King Hall D145

students will keep their teachers learning; as they say, to keep young, keep learning.

With the advent of such instructional media as computers in the classroom, the increased use of video, and arriving interactive videodisc technology, there is a strong possibility that certain parts of education will be increasingly individualized in the future. Much of the drill and practice in math can be effectively monitored using a computer. Yet, the social aspects of learning will continue to be increasingly important. Cooperative learning, small group projects, independent study, and the fusion of multiculturalism even in math and science classrooms, will become increasingly important in the education of limited English proficient students. By encouraging and supporting the students and their teachers through a whole school and community effort, a model developed by the California Academic Partnership Program projects, the challenges for success in mathematics and science for LEP students are certainly surmountable.

REFERENCES

Galligani, Dennis J. Effective Relationships for School/College Partnerships: A Qualitative Evaluation of the Curriculum Enhancement Projects Participating in the California Academic Partnership Program 1984 - 1987. Long Beach: CAPP, July 1, 1987.

California Postsecondary Education Commission (CPEC). Evaluation of the California Academic Partnership Program (CAPP): A Report to the Legislative in Response to Assembly Bill 2398 (Chapter 620, Statues

of 1984). Sacramento: CPEC, March 1988.

Evaluation and Training Institute (ETI). California Academic Partnership Program: External Evaluator's Annual Report. Los Angeles: ETI, July 30 ,1988.